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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,565	11/11/2003	Jui-Mu Cho	24061.30 (TSMC2002-0969)	6917
42717	7590	08/01/2005	EXAMINER	
HAYNES AND BOONE, LLP 901 MAIN STREET, SUITE 3100 DALLAS, TX 75202			MCDONALD, RODNEY GLENN	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 08/01/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/706,565

Applicant(s)

CHO ET AL.

Examiner

Rodney G. McDonald

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-10, 13-15, 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Ding (WO 99/48131).

Regarding claim 1, Ding teaches a system in Figs. 1 and 2 for depositing a metal film onto a substrate. (See Figs. 1 and 2; Page 8) The system comprises a deposition chamber 102, a coil 104 comprised of a first metal having opposite terminal ends disposed within the deposition chamber 102. (See Figs. 1 and 2) The opposite terminal ends are angled less than ninety degrees. (See Fig. 6)

Regarding claim 2, one end of the coil is angled at 45 degrees. (See Fig. 6)

Regarding claim 3, the coil defines a plane and at least a portion of at least one opposite terminal is non-perpendicular to the plane. (See Fig. 6)

Regarding claim 4, a target 110 is disposed in the chamber and comprises a second metal. (See Fig. 2; Page 8)

Regarding claim 6, the first and second metals can be the same materials.
(Page 8)

Regarding claim 7, the coil can be 12 inches in diameter. (i.e. greater than 300 mm) (See Page 8)

Regarding claim 8, the coil can be non-circular (i.e. rectangular in cross section) (See Fig. 7)

Regarding claim 9, the structural features of the apparatus are discussed above. (i.e. the coil being a metal with opposite terminal ends angled less than ninety degrees; the target material) The method comprises sputtering material from the target of the second metal through a coil, which is applied with RF power to deposit material on the substrate. (See Page 6-8)

Regarding claim 10, the coil defines a plane and at least a portion of at least one opposite terminal is non-perpendicular to the plane. (See Fig. 6)

Regarding claim 13, the first and second metals can be the same materials. (Page 8)

Regarding claim 14, the coil can be 12 inches in diameter. (i.e. greater than 300 mm) (See Page 8)

Regarding claim 15, Ding teaches a system in Figs. 1 and 2 for depositing a metal film onto a substrate. (See Figs. 1 and 2; Page 8) The system comprises a deposition chamber 102, a coil 104 comprised of a first metal having opposite terminal ends disposed within the deposition chamber 102. (See Figs. 1 and 2) The opposite terminal ends are angled less than ninety degrees. The coil is contiguous except for the small gap in the band. (See Fig. 6) A target 110 is utilized for depositing a first metal. (Fig. 2) A chuck 114 is utilized to secure the wafer. (See Fig. 2)

Regarding claim 17, the first and second metals can be the same materials. (Page 8)

Regarding claim 18, the coil can be 12 inches in diameter. (i.e. greater than 300 mm) (See Page 8)

Regarding claim 19, Ding teaches a system in Figs. 1 and 2 for depositing a metal film onto a substrate. (See Figs. 1 and 2; Page 8) The system comprises a deposition chamber 102, a coil 104 comprised of a first metal having opposite terminal ends disposed within the deposition chamber 102. (See Figs. 1 and 2) The coil can be applied with RF power from source 106 connected from a single power terminal. (See Fig. 2) The opposite terminal ends are angled less than ninety degrees. The coil is contiguous except for the small gap in the band. (See Fig. 6) A target 110 is utilized for depositing a first metal. (Fig. 2) A chuck 114 is utilized to secure the wafer. (See Fig. 2)

Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Mosely et al. (U.S. Pat. 5,431,799).

Regarding claim 19, Mosely et al. teach a deposition chamber in Fig. 2 having power supplies 52, 62 for providing radio frequency power. Solid and contiguous coils 80, 82 are disposed in the chamber. The coils are connected to a single power terminal of the power supplies 52, 62. (See Fig. 2)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 5, 9, 12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding (WO 99/48131) in view of Buchanan et al. (U.S. Pat. 6,660,140).

Ding is discussed above and all is as applies above. (See Ding discussed above)

The difference between Ding and the present claims is that the thickness of the depositing film is not discussed.

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Buchanan et al. teach utilizing a coil and target to deposit film of titanium at 20 nm thick (Column 5 lines 57) and a film of titanium nitride at 40 nm thick. (Column 6 lines 1-2)

The motivation for depositing films at a certain thickness is that it allows for forming a DRAM interconnection layer. (Column 5 lines 44-46)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Ding by utilizing a particular thickness of a deposited film as taught by Buchanan et al. because it allows for forming a DRAM interconnection layer.

Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding (WO 99/48131) in view of Nulman et al. (U.S. Pat. 6,783,639).

Ding is discussed above and all is as applies above. (See Ding discussed above)

The difference between the present claims and Ding is that the uniformity is not discussed.

Nulman teach in Fig. 8 controlling the power to the coil and target to achieve a uniform layer at 0% of non-uniformity. (See Fig. 8; Column 7 lines 38-68; Column 8 lines 1-9)

The motivation for controlling power to the coil and the target is that it achieves a more uniform film. (Column 2 lines 35-40)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Ding by depositing uniformly by

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controlling power to the coil and the target as taught by Nulman because it allows for depositing a more uniform film.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
July 26, 2005